IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Margit Hiller et al.	)	Group Art Unit: 1795
Serial No.	10/579,164	)	Examiner: C.N. Robinson
Filed:	May 29, 2007	)	Confirmation No. 1591
For:	METHOD FOR PRODUCING FLEXOGRAPHIC PRINTING FORMS BY THERMAL DEVELOPMENT	)	

Mail Stop Appeal
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

The appellant filed a Notice of Appeal in the above-identified application on March 18, 2010 under 35 U.S.C. § 134(a), and submits this Appeal Brief under 37 CFR § 41.37 in furtherance of said Notice of Appeal. The fees required under § 41.20(b)(2) are addressed in the accompanying Transmittal of Appeal Brief. The appellant respectfully submits that this Appeal Brief is timely filed under 37 CFR 1.191. The appellant requests entry, consideration, and favorable action on this appeal.

TABLE OF CONTENTS

Page

I. REAL PARTY IN INTEREST

The real party in interest is XSYS Print Solutions Deutschland GmbH, the exclusive assignee of the subject patent application.

II. RELATED APPEALS AND INTERFERENCES

There are no prior or pending appeals, judicial proceedings or interferences known to the appellant which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-15 are pending, have been twice rejected and are the subjects of this appeal. None of the claims have been cancelled or allowed.

IV. STATUS OF AMENDMENTS

Applicant filed an Amendment After Final Rejection on February 18, 2010 in which applicant presented arguments in response to the final Office Action, dated December 18, 2009. None of the claims were amended in the Amendment After Final Rejection. In the Advisory Action mailed February 25, 2010, Examiner entered the proposed amendment (even though no claims had been amended in the Applicant's Amendment After Final Rejection), stated that the amendment did not place the application in condition for allowance and maintained the rejections presented in the previous final Office Action, dated December 18, 2009.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed to a method for making flexographic printing plates by thermal development. Abstract. Claim 1 is the only independent claim pending in this application.

The novelty of the invention described in claim 1 lies in both the *composition* of the starting material and the *thermal development process* used to create the flexographic printing plate. Specification, at page 3, line 16 – page 4, line 25.

The starting material is a photopolymerizable flexographic printing element which comprises a dimensionally stable substrate and at least one photopolymerizable relief-forming layer. *Id.* at page 3, lines 22-38. The photopolymerizable relief-forming layer at least comprises an elastomeric binder, ethylenically unsaturated monomers, plasticizer and photoinitiator. *Id*. at page 3, lines 36-38. The elastomeric binder, in turn, is at least one styrene/butadiene block copolymer ("SB block copolymer") having a molecular weight M_w of from 80,000 to 250,000 g/mol and a styrene content of from 15-35% by weight, based on the binder. *Id.* at page 4, lines 10-16. As disclosed in the specification, the SB block copolymer may be two-, three- or multi-block copolymers in which a plurality of styrene and butadiene blocks alternate with each other. *Id*. at page 5, lines 8-15. Claim 1 specifically requires that that the elastomeric binder has:

- an amount of the SB block copolymer being from 35-50% by weight, based on the sum of all components in the relief-forming layer; and
- a proportion of butadiene present in 1,2-linked form being at least 15% by weight, based on the binder.

Id. at page 4, lines 10-16. While SBS-based flexographic printing elements have been successfully developed using solvents, it had not been possible to satisfactorily develop SBS-based flexographic printing elements by thermal development as of the invention date. *Id.* at page 3, lines 14-20. The significance of the features described in claim 1 is that it permits for an SBS-based flexographic printing element to be successfully subjected to thermal development. *See, e.g., Id*. at page 21, line 1 – page 31, line 12..

Claim 1 further recites that the SBS-based photopolymerizable flexographic printing element is subjected to *thermal development*. *Id.* at page 3, line 40 – page 4, line 8. The thermal development process is claimed to comprise at least the steps of:

(a) imagewise exposure of the photopolymerizable relief-forming layer to actinic radiation,

(b) heating of the exposed flexographic printing element to a temperature of from 40 to 200°C,

(c) removal of the softened, unpolymerized parts of the relief-forming layer with the formation of a printing relief.

Id. Applicants disclose that "[t]he SBS-based flexographic printing elements used should not have negative exposure latitude and, after the thermal development, should permit the formation of crisp-edged elements without melt residues remaining behind on the element edges." *Id.*, at page 3, lines 22-27.

As demonstrated by the data presented in the specification, only the flexographic printing elements having an amount of the elastomeric binder (SB block copolymer) within the claimed range of 35-50% by weight produced printing plates with positive exposure latitudes following thermal development. *See id.*, at page 30, line 15 – page

31, line 4 and Table 2 (Example Nos. 1-B and 2-B). In contrast, the flexographic printing elements having an amount of the elastomeric binder just outside of claimed range produced printing plates with negative exposure latitudes following thermal development. *See id.* (cf. Example Nos. C3-B and C4-B). Applicants have also demonstrated the criticality of having "the proportion of butadiene present in 1,2-linked form being at least 15% by weight, based on the binder" of claim 1. *See id.* (compare Example Nos. 1-B vs. C5-B).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-15 are unpatentable under 35 U.S.C. § 103(a) as being obvious over Suzuki et al., U.S. Pat. No. 5,889,116 ("Suzuki"), in view of Dudek et al., WO 01/88615 ("Dudek").

VII. ARGUMENT

A. Claims 1-3 and 8-15.

1. A prima facie case of obviousness is not made because Suzuki and Dudek each teach away from their combination.

Claims 1-3 and 8-15 are not rendered obvious under 35 U.S.C. § 103(a) over Suzuki in view of Dudek et al. as the references each teach away from their combination.

The entire disclosure of Suzuki is focused on solving a problem that is *specific* to *solvent development* of photosensitive compositions. Specifically, Suzuki discloses that photosensitive materials used to prepare flexographic printing plates are "*washed at a high rate* so that the relief is easily formed" as part of the solvent development process. Suzuki, at col. 1, lines 27-31 (emphasis added). This high rate of washing, however,

cannot be performed on photosensitive rubber plates comprising elastomers, such as a styrene-butadiene block copolymer. *Id.* at col. 1, lines 32-40. Therefore, Suzuki purports to solve this problem by incorporating a hydrophilic copolymer in the preparation of the photosensitive compositions so as to make the compositions suitable for the washing stage of solvent development. *Id.* at col. 1, line 54 – col. 2, line 45 and col. 12, lines 27-40. The addition of this hydrophilic copolymer is disclosed to enhance the strength and processability of the photosensitive composition for the high rate solvent wash process. *Id.* at col. 1, lines 49-51 and col. 6, lines 57-69.

Insofar as Suzuki is focused entirely on solving a problem that is specific to the solvent development process, Suzuki is unconcerned with and completely silent as to thermal development. Notwithstanding this, Examiner relies on Suzuki as purportedly disclosing the thermal development process of Applicants' claim 1, except for the step of "(c) removal of the softened, unpolymerized parts of the relief-forming layer with formation of a printing relief." *See* Final Office Action, dated 12/18/09 and Advisory Action, dated 2/25/10. "A prior art reference must be considered in its entirety, i.e., as a <u>whole</u>, including portions that would lead away from the claimed invention." M.P.E.P. § 2141.02. As explained above, Suzuki is silent as to a thermal development process, as it is focused entirely on solving a problem that is specific to the solvent development process by a photosensitive composition that is particularly adapted for that process. As such, Suzuki cannot be relied upon as teaching any part of a thermal development process.

The Examiner relies on Dudek as supplying the removal step that is not disclosed in Suzuki and concludes that it would have been obvious to include the

removal process step of Dudek in the process of Suzuki. A *prima facie* case of obviousness is not made here, as Suzuki and Dudek each teach away from their combination. As pointed out in Applicants' specification, Dudek "states that commercially available flexographic printing elements intended for development of the solvents are frequently unsuitable for thermal development and instead proposes flexographic printing elements whose relief-forming layer has certain dynamic mechanical characteristics." Specification, at page 2, lines 13-16. To that end, Dudek discloses only a thermal development process, specifically distinguishing it from the solvent development process: "To avoid the problems with solution development, a 'dry' thermal development process may be used." Dudek, at page 1, lines 28-29. As Dudek demonstrates, thermal development is understood to exclude a process which utilizes solvents to produce the flexographic printing elements. Indeed, it is improper to combine references where, as here, the references teach away from their combination. M.P.E.P. § 2145, citing *In re Grasselli,* 713 F.2d 731, 743 (Fed. Cir. 1983).

A combination Suzuki and Dudek would not only change the fundamental principle of operation of each of these references, it would render the references unsatisfactory for each of their respective purposes. As explained above, Suzuki discloses a photosensitive composition that is particularly suited for the solvent development processes. To that end, Suzuki discloses that the amount of elastomer contained in the photosensitive composition is critical:

> If the amount of elastomer is too large, the photosensitive rubber plate made from the photosensitive composition exhibits a reduced rate of washing. In contrast, if the amount of elastomer is too small, the

> processability of the photosensitive composition and the resistance of the photosensitive rubber plate to an aqueous ink are reduced.

Suzuki, at col. 8, lines 33-39. Suzuki discloses that the amount of elastomer contained in the photosensitive composition is in the range of 20 to 65 parts by weight, preferably 30 to 60 parts by weight, based on the sum of the elastomer and the hydrophilic copolymer. *Id.* at col. 8, lines 29-33.

In contrast, Dudek discloses that its photosensitive composition preferably comprise *at least* 60% by of an elastomeric binder (*Id.* at page 4, lines 29-31) and that "[s]urprisingly, it has been found that the photopolymerizable elastomeric layer needs to be in a particular range of certain rheological properties to ensure the generation of a desired relief and also good printing performance after thermal treatment. *Id.* at col. 6, lines 3-6. Given the teachings of Dudek, one would not expect the photosensitive composition of Suzuki to be susceptible to successful thermal development. "If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." M.P.E.P. § 2143.01, citing *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

2. Applicants' data shows unexpected results sufficient to overcome a prima facie case of obviousness.

Even assuming that the Examiner has made a *prima facie* case of obviousness, Applicants have presented data to show the unexpectedly superior results of its claimed photosensitive composition. Claim 1 recites a photopolymerizable relief-forming layer comprising an elastomeric binder, which is defined as "at least one styrene/butadiene block copolymer" and that "the amount of the styrene/butadiene block copolymer is from 35 to 50% by weight…based…on the sum of all components in the relief-forming layer." Applicants have presented data in the specification showing the criticality of this range in achieving successful thermal development of the photopolymerizable relief-forming layer. Indeed, based the disclosure of Dudek, a photosensitive composition having *less than* 60% by weight of an elastomeric binder would not be expected to be a good candidate for thermal development. Dudek, at page 4, lines 29-31.

The flexographic printing plates produced from examples 1 and 2 have an amount of the elastomeric binder within the claimed ranges: 45% and 38.2%, respectively. Specification, at page 21-22. The flexographic printing plates produced from comparative examples C3 and C4[1] have an amount of the elastomeric binder that falls just outside of the claimed ranges: 52% and 31% by weight.[2] *Id.*, at pages 23-24.

---

[1] It is noted that the description following Example C4 (Comparative Example), at page 24, line 3 contains a typographical error. It currently reads "Binder Content Too High"; this should be corrected to read "Binder Content Too Low."

[2] The amount of the elastomeric binders in Examples 1, 2, C3 and C4 is based on the amounts listed for Kraton®D-1192 multiplied by 0.67, as what is referred to as "Kraton®D-1192 compound" in the specification is described as comprising 67% by weight of Kraton D-1192 and 33% by weight of Ondina 934…" *See* Specification, at page 21, lines 3-6.

As shown in Table 1, all of the flexographic printing elements provide suitable results from conventional solvent development, as indicated by the positive exposure latitude (ELAT) obtained (see bottom row):

TABLE 1

List of results from examples and comparative examples on development by means of a developer liquid

		Example No.						
		1	2	C3	C4	C5	C6	C7
Data for the composition								
Main binder		v-SBS	v-SBS	v-SBS	v-SBS	SBS	SBS	SIS
Sum of binders	% by wt.	45	48	52	51	48	55	72
Proportion of vinyl groups of main binder	% by wt.	28	28	28	28	7	7	7
Proportion of vinyl groups of binder 2	% by wt.		7		7	7		
Sum of plasticizers	% by wt.	42	39	36	36	39	32	10
Sum of all vinyl groups	% by wt.	22	28	19	19	12	18	14
Anisotropy factor AF		1.0	1.1	4.2	1.4	1.1	1.0	1.0
		Development by means of developer liquid: Example No.						
		1-A	2-A	C3-A	C4-A	C5-A	C6-A	C7-A
Preexposure time	sec	15	15	15	15	15	20	20
Washout rate	mm/min	140	140	140	140	140	160	120
Postexposure time UVA	min	10	10	10	10	10	10	10
Postexposure time UVC	min	20	20	20	20	20	20	20
Relief height	μm	730	710	760	700	740	670	680
Mechanical hardness (DIN 53505)	°Shore A	50	61	66	56	45	63	
LEL	min	8	8	6	8	10	8	10
UEL	min	>18	>18	>18	>18	>18	>18	>18
ELAT (exposure latitude)	min	>+10	>+10	>+12	>+10	>+8	>+10	>+8

As shown in Table 2, however, only the flexographic printing elements from examples 1-B and 2-B, having the elastomeric binder within the claimed 35 to 50% range, showed a positive ELAT following thermal development (see bottom row):

TABLE 2

List of results from examples and comparative examples on thermal development.

		Example No.						
		1	2	C3	C4	C5	C6	C7
Data for the composition								
Main binder		v-SBS	v-SBS	v-SBS	v-SBS	SBS	SBS	SIS
Sum of binders	% by wt.	45	48	52	51	48	55	72
Proportion of vinyl groups of main binder	% by wt.	28	28	28	28	7	7	7
Proportion of vinyl groups of binder 2	% by wt.		7		7	7		
Sum of plasticizers	% by wt.	42	39	36	36	39	32	10
Sum of all vinyl groups	% by wt.	22	28	19	19	12	18	14
Anisotropy factor AF		1.0	1.1	4.2	1.4	1.1	1.0	1.0
		Thermal development: Example No.						
		1-B	2-B	C3-B	C4-B	C5-B	C6-B	C7-B
Preexposure time	sec	15	15	15	15	15	20	20
Number of processing cycles		10	10	10	10	10	10	10
Temperature of heating roll	° C.	163	163	163	163	163	163	163
Postexposure time UVA	min	10	10	10	10	10	10	10
Postexposure time UVC	min	20	20	20	20	20	20	20
Relief height	μm	630	570	510	390	580	770	530
Mechanical hardness (DIN 53505)	°Shore A	50	61	66	56	45	63	
LEL	min	8	10	8	8	>18	>18	10
UEL	min	10	10	4	2	8	10	2
ELAT (exposure latitude)	min	+2	0	−4	−6	<−10	<−8	−8

The significance of the positive ELATs obtained for the claimed flexographic printing elements is further explained in the specification:

> On thermal processing (cf. table 2), however, only the novel flexographic printing elements give printing plates having an exposure latitude of $\geq$ 0. Such flexographic printing elements can be thermally developed without

problems after imagewise exposure. In the comparative examples, the exposure latitude is negative. This means that such flexographic printing elements already have reduced relief depths in negative elements at exposure times which are necessary for the correct formation of positive elements. On printing, this leads to rapid clogging with printing ink and hence, particularly in relatively long print runs, to a low-quality, blurred printed image and a greater increase in tonal value. From time to time, the printing process has to be stopped and the plate cleaned.

Specification, at page 30, line 15 – page 31, line 4.

In addition to the criticality of the claimed 35 to 50% range for the amount of the elastomeric binder present in the photosensitive composition, Applicants have additionally demonstrated the criticality of having "the proportion of butadiene present in 1,2-linked form being at least 15% by weight, based on the binder," as described in claim 1. With reference to Tables 1 and 2, the value associated with the "Proportion of vinyl groups of main binder" corresponds to the "proportion of butadiene present in 1,2-linked form" of claim 1. A comparison of examples 1-B and C5-B in Table 2 demonstrate the criticality of having "the proportion of butadiene present in 1,2-linked form being *at least 15% by weight, based on the binder*." The value corresponding to the proportion of butadiene present in 1,2-linked form is 28% by weight in example 1 and 7% by weight in example C5. As shown in Table 2, a positive ELAT value was obtained for example 1-B, as compared to a negative ELAT value for example C5-B.

In sum, the comparative data presented in Applicants' specification demonstrate the unexpectedly superior results which are obtained from flexographic printing elements which comprise:

- "the amount of styrene/butadiene block copolymer…from 35 to 50% by weight…based…on the sum of all components in the relief-forming layer" (examples 1-B and 2-B in Table 2) as compared flexographic printing elements just outside of this range (examples C3-B and C4-B in Table 2) and/or
- "the proportion of butadiene present in 1,2-linked form being at least 15% by weight based on the binder" (28% in example 1-B, Table 2) as compared to flexographic printing elements having less than the claimed amount (7% in example C5-B, Table 2).

Therefore, even assuming that the Examiner has made a *prima facie* case of obviousness, the unexpected results of the claimed ranges demonstrated by Applicants' data is sufficient to overcome any such *prima facie* case of obviousness. M.P.E.P. § 2145 ("Usually, a showing of unexpected results is sufficient to overcome a *prima facie* case of obviousness").

B. <u>Claim 4</u>

In addition to being allowable as depending from allowable base claim 1, claim 4 is independently allowable because no combination of Suzuki and Dudek disclose, teach or suggest "[a] process according to claim 1, wherein the plasticizer is a mixture of plasticizers which comprises at least one polybutadiene oil."

Therefore, failing to disclose or suggest all the claimed elements of claim 4, Suzuki and Dudek present no bar to patentability under 35 U.S.C. § 103(a).

C. Claim 5

In addition to being allowable as depending from allowable base claims 1 and 4, claim 5 is independently allowable because no combination of Suzuki and Dudek disclose, teach or suggest "[a] process according to claim 4, wherein the plasticizer mixture further comprises at least one mineral oil."

Therefore, failing to disclose or suggest all the claimed elements of claim 5, Suzuki and Dudek present no bar to patentability under 35 U.S.C. § 103(a).

D. Claim 6

In addition to being allowable as depending from allowable base claims 1 and 4, claim 5 is independently allowable because no combination of Suzuki and Dudek disclose, teach or suggest "[a] process according to claim 4, wherein at least 40% by weight of the butadiene units in the polybutadiene oil are incorporated in 1,2-linked form."

Therefore, failing to disclose or suggest all the claimed elements of claim 6, Suzuki and Dudek present no bar to patentability under 35 U.S.C. § 103(a).

E. Claim 7

In addition to being allowable as depending from allowable base claim 1, claim 7 is independently allowable because no combination of Suzuki and Dudek disclose,

teach or suggest “[a] process of claim 1, wherein the relief-forming layer additionally comprises up to 20% by weight of at least one secondary binder.”

Therefore, failing to disclose or suggest all the claimed elements of claim 7, Suzuki and Dudek present no bar to patentability under 35 U.S.C. § 103(a).

VIII. CONCLUSION.

It is believed that the claims define an invention which is new, useful, and unobvious. For the above reasons, the applicant requests passage to allowance. The PTO is authorized to charge Deposit Account No. 03-2775 for any fees due in connection with the filing of this Appeal Brief.

An appropriate extension of time to respond is respectfully petitioned for, and the Commissioner is hereby authorized to charge the account of the undersigned attorneys, Patent Office Deposit Account No. 03-2775, for any fees which may be due upon the filing of this paper.

Respectfully submitted,

Connolly Bove Lodge & Hutz LLP

June 18, 2007

By

Michelle C. Kim, Reg. No. 51,881
P.O. Box 2207
Wilmington, DE 19899

(213) 787-2508

CLAIMS APPENDIX

1. A process for the production of flexographic printing plates by thermal development, in which the starting material used is a photopolymerizable flexographic printing element which comprises, arranged one on top of the other, at least

- a dimensionally stable substrate,
- at least one photopolymerizable relief-forming layer, at least comprising an elastomeric binder, ethylenically unsaturated monomers, plasticizer and photoinitiator,

and the process comprises at least the following steps:

(a) imagewise exposure of the photopolymerizable relief-forming layer to actinic radiation,

(b) heating of the exposed flexographic printing element to a temperature of from 40 to 200°C,

(c) removal of the softened, unpolymerized parts of the relief-forming layer with formation of a printing relief,

wherein the elastomeric binder is at least one styrene/butadiene block copolymer having a molecular weight Mw of from 80 000 to 250 000 g/mol and a styrene content of from 15 to 35% by weight, based on the binder, the proportion of butadiene present in 1,2-linked form being at least 15% by weight, based on the binder, and the amount of the styrene/butadiene block copolymer is from 35 to 50% by weight and that of the plasticizer is from 25 to 50% by weight, based in each case on the sum of all components of the relief-forming layer.

2. A process according to claim 1, wherein the amount of the plasticizer is from 30 to 45% by weight and that of the styrene/butadiene block copolymer is from 35 to 50% by weight, based in each case on the sum of all components of the relief-forming layer.

3. A process according to claim 1, wherein the proportion of butadiene which is present in 1,2-linked form in the polymer is at least 20% by weight, based on the binder.

4. A process according to claim 1, wherein the plasticizer is a mixture of plasticizers which comprises at least one polybutadiene oil.

5. A process according to claim 4, wherein the plasticizer mixture furthermore comprises at least one mineral oil.

6. A process according to claim 4, wherein at least 40% by weight of the butadiene units in the polybutadiene oil are incorporated in 1,2-linked form.

7. A process according to claim 1, wherein the relief-forming layer additionally comprises up to 20% by weight of at least one secondary binder.

8. A process according to claim 1, wherein the imagewise exposure (a) is carried out by positioning a mask on the flexographic printing element and effecting exposure to light through the positioned mask.

9. A process according to claim 1, wherein the flexographic printing element additionally has a digitally imageable layer and step (a) is carried out by recording imagewise on the digitally imageable layer and effecting exposure to light through the mask thus created in situ.

10. A process according to claim 9, wherein the digitally imageable mask is a mask selected from the group consisting of IR-ablative masks, inkjet masks and thermographic masks.

11. A process according to claim 9, wherein the digitally imageable layer or the residues thereof is or are removed from the relief-forming layer before process step (b).

12. A process according to claim 11, wherein the digitally imageable layer is water-soluble, and the digitally imageable layer or the residues thereof is or are removed with water or a predominantly aqueous solvent before step (b).

13. A process according to claim 1, wherein the removal of the softened, unpolymerized parts is carried out by bringing the flexographic printing element into contact with an absorbent material.

14. A process according to claim 1, wherein the removal of the softened, unpolymerized parts is carried out by processing the flexographic printing element with hot air or liquid streams under pressure.

15. A process according to claim 1, wherein the temperature in step (b) is from 60 to 160°C.

EVIDENCE APPENDIX

None.

RELATED PROCEEDING APPENDIX

None.